



Силабус освітнього компонента

Програма навчальної дисципліни

BASICS OF TECHNOLOGICAL FORECASTING



Шифр та назва спеціальності
133 - Industrial engineering

Інститут
NNI of Mechanical Engineering and Transport

Освітня програма
Applied mechanics

Кафедра
Mechanical engineering technology and metal cutting machines (146)

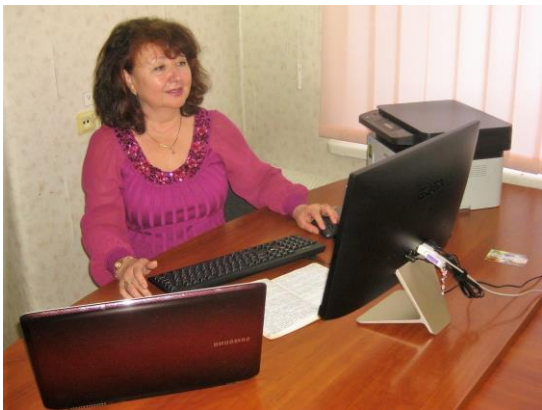
Рівень освіти
Bachelor

Тип дисципліни
Disciplines of the student's free choice from the university-wide catalog of disciplines

Семестр
7

Мова викладання
English

Викладачі, розробники



DOBROTVOISKA LIUDMYLA,
liudmyla.dobrovolska@khpі.edu.ua

Associate Professor, Candidate of Technical Sciences, Associate Professor of the department "Technology of mechanical engineering and metal-cutting lathes" KhPI. Work experience - 30years. Author of more than 70 scientific and educational and methodological works. Leading lecturer in the disciplines: "BASICS OF TECHNOLOGICAL FORECASTING", "Technological processes of folding machines and machines", "TECHNOLOGICAL EQUIPMENT"

[Детальніше про викладача на сайті кафедри](#)

Загальна інформація

Анотація

The discipline is aimed at mastering the theoretical foundations and systematized knowledge of technological forecasting.

The features of the process are considered, during which prospective changes in consumer properties of products, technological processes, and equipment, as well as adequate changes in production costs, are determined

Мета та цілі дисципліни

Develop the students' theoretical ideas and practical skills for future activities related to the application of technological forecasting methods..

Формат занять

Lectures, laboratory works, independent work, consultations, conversations, discussions, stories, shows, demonstrations, independent work, generalization and classification of the received information, etc.
Final control - exam.

Компетентності

ZK1. The ability to think abstractly.

ZK2. Ability to apply knowledge in practical situations.

ZK4. Ability to search, process and analyze information from various sources.

ZK5. Ability to generate new ideas (creativity).

ZK6. The ability to conduct research at a certain level.

ZK8. The ability to act socially responsibly and consciously.

ZK10. Skills in using information and communication technologies.

ZK11. Ability to work in a team.

ZK12. The ability to realize one's rights and responsibilities as a member of society, to realize the values of a civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine.

FK1. Ability to apply typical analytical methods and computer software tools for solving engineering problems of industrial mechanical engineering, effective quantitative methods of mathematics, physics, engineering sciences, as well as appropriate computer software for solving engineering problems of industrial mechanical engineering.

FC2. The ability to apply fundamental scientific facts, concepts, theories, principles to solve professional problems and practical problems of industrial mechanical engineering.

Program competencies according to the educational program.

FK4. The ability to implement engineering developments in industrial mechanical engineering, taking into account technical, organizational, legal, economic and environmental aspects throughout the life cycle of the machine: from design, construction, operation, maintenance, diagnostics and disposal.

FC5. Ability to use computerized design systems and specialized application software to solve engineering tasks in the field of mechanical engineering.

FC6. The ability to evaluate the technical and economic efficiency of typical systems and their components based on the application of analytical methods, analysis of analogues and the use of available data.

FC7. The ability to make effective decisions regarding the selection of construction materials, equipment, processes and to combine theory and practice to solve an engineering task.

FC8. The ability to realize creative and innovative potential in project development in the field of mechanical engineering.

Результати навчання

PH4. Carry out engineering calculations to solve complex problems and practical problems in industrial mechanical engineering.

PH5. Analyze engineering objects, processes and methods.

PH7. Prepare production and operate products using automatic life cycle support systems.

PH9. Choose and apply the necessary equipment, tools and methods.

PH10. To understand the problems of labor protection and legal aspects of engineering activity in industrial mechanical engineering, the skills of forecasting the social and environmental consequences of the implementation of technical tasks.

Обсяг дисципліни

Загальний обсяг дисципліни 120 год. (4 кредитів ECTS): лекції – 32 год., лабораторні заняття – 16 год., самостійна робота – 72 год. РГ

Передумови вивчення дисципліни (пререквізити)

To successfully pass the course, you must have the knowledge and practical skills in the following disciplines: "Technological foundations of mechanical engineering", "Equipment and transport of machining shops", "Metal cutting machines".

Особливості дисципліни, методи та технології навчання

Teaching methods:



- the educational project, which conceptually consists of "learning through activity" is used mainly in practical work (rarely in lectures). Application of the method involves providing students with a wide enough set of projects to realize the possibility of a real choice. It should be noted that projects can be both individual and collective. The latter, among other things, contribute to the student's mastering of collective work methods. In order to master the project method of work, the student is provided with instructions on working on the project (methodological instructions). Each educational project involves obtaining a final result using improvised material on the topic of work, the results of which become a reference for obtaining a final assessment. Collective discussion of difficult moments in solving the given task forms the terrain of collective work and is a positive experience for both the student and the teacher.
 - The project method is mainly focused on mastering the methods of working with DHW. An obligatory component of the learning process is control, or verification of learning results. The essence of checking the learning results is to identify the level of knowledge acquisition by students, which must meet the educational standard of the academic discipline.
 - Explanatory and illustrative method, which involves the use of visual lecture material in the form of tables, posters, presentations made in the MS Power Point environment.
 - Reproductive method used in performing practical work and solving typical tasks.
 - The method of stimulating and motivating learning is applicable when encouraging students to independently study the materials of the discipline (the possibility of receiving motivational additional points for active work in classes, when preparing reports or completing a calculation task in advance).
 - Methods of control and self-control, which involve checking current knowledge with instant surveys or short-term tests at the beginning of the lesson, as well as planned modular controls.
- Mastering the discipline involves constant contact between the teacher and the student through a conversation, lecture, story, shows, demonstrations, self-study, independent work, generalization and classification of the information received, etc..

Програма навчальної дисципліни

Теми лекційних занять

Topic 1. Introduction

Technological forecasting is a science of laws and methods of developing forecasts of dynamic systems in engineering. Terms and definitions.

The formation and change of technological structures in the world's technical and economic development.

The life cycle of machine-building products and their technological component. Stable, fruitful, and changing technologies.

Mechatronics is a priority area of technosphere development.

Lean production.

The world market of technological equipment.

Topic 2. Methods of Technological Forecasting

Analysis of trends. Expert evaluations. Analysis of patent trends and scientific and technical literature.

Extrapolation of trends and regression analysis. S-curves and historical analogies.

Technological forecasting based on S-curve analysis.

Time series forecasting. Holt-Winters model.

Topic 3. Retrospective analysis of technological equipment and technological forecasting

Technological forecasting and decision-making regarding the selection of technological equipment.

Aggregate machines, history, and modernity.

Prospects for the development of machines of aggregate-modular design.

Теми практичних занять

Topic 1. Stages of the life cycle of machine-building products and technologies

Retrospective of technological structures.

Analysis of the life cycle of technology.

Topic 2. Analysis of layouts of modern machines of aggregate-modular design

Analysis of the layouts of aggregate machines of the latest generation.

Layout of mobile machines of aggregate-modular design for the repair of parts and assemblies of turbo-units that cannot be dismantled.



Topic 3. Studying...

Time series forecasting based on the Holt-Winters model.

Technological forecasting based on S-curve analysis

Теми лабораторних робіт

Самостійна робота

The course involves the performance of an individual task on the analysis of a specific problem in industrial mechanical engineering. All results of individual developments are drawn up in a written report (abstract). Additional materials (videos, articles) for independent study and analysis are also recommended to those seeking education

Література та навчальні матеріали

"Basic literature":

Permyakov O.A., Yakovenko I.E. Technological forecasting. Introductory course: study guide for students of specialty 131 – Applied Mechanics and 133 – Industrial Mechanical Engineering / O.A. Permyakov, I.E. Yakovenko – Kharkiv: KhPI National Technical University, 2022. – 178 p.

Technological basics of mechanical engineering: a study guide for students of specialties 131 – Applied mechanics, 133 – Industry mechanical engineering / I.E. Yakovenko, O.A. Permyakov, A.V. Fesenko - Kharkiv: NTU "KhPI", 2022. - 421 p.

Flexible production systems: a study guide for students of the direction 131 Applied mechanics - 2nd ed. revised and supplemented /I.E. Yakovenko, O. A. Permyakov, O. M. Shelkova - Kharkiv: "Disa plus", 2021. - 284 p.

Ivanov V.V. Analysis of time series and forecasting of economic indicators. – Kharkiv, Karazin National University, 1999. - 229 p.

"Additional literature":

Mechanical engineering technology: Handbook for the performance of qualification works: education. manual /I.I. Yurchyshyn, Y.M. Lytvynyak, I.E. Hrytsai and others; under the editorship I.I. Yurchyshyn - Lviv: publishing house of Lviv Polytechnic University, 2009. - 527 p.

Integrated generative technologies: учеб. allowance [for students high studies established] /A.I.

Hrabchenko, Y.N. Vnukov, V.L. Dobroskok, L.I. Pupan, V.A. Fadeev; under the editorship A.I. Hrabchenko. - Kharkiv: NTU "Khpy", 2011. - 416 p



Система оцінювання

Критерії оцінювання успішності студента та розподіл балів

. 100% of the final grade consists of assessment results in the form of an exam (40%) and current assessment (60%).
Current evaluation: 2 tests (12% and 10%) and an individual calculation task (10%), an active position when discussing issues at lectures and practical classes (5%), successful performance of practical work (10%), preparation of an individual illustrated report on given topic (3%).
Exam: written assignment (2 questions from theory + solution of a practical problem) and oral conversation

Шкала оцінювання

Сума балів	Національна оцінка	ECTS
90–100	Відмінно	A
82–89	Добре	B
75–81	Добре	C
64–74	Задовільно	D
60–63	Задовільно	E
35–59	Незадовільно (потрібне додаткове вивчення)	FX
1–34	Незадовільно (потрібне повторне вивчення)	F

Норми академічної етики і політика курсу

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": show discipline, education, benevolence, honesty, responsibility. Conflict situations should be openly discussed in study groups with the teacher, and if it is impossible to resolve the conflict, it should be brought to the attention of the employees of the institute's directorate.

Regulatory and legal support for the implementation of the principles of academic integrity of NTU "KhPI" is posted on the website: <http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/>

Погодження

Syllabus agreed



Завідувач кафедри
Oleksandr PERMYAKOV

Гарант ОП

